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A NEW SPECIES OF *DASINEURA* (DIPTERA: CECIDOMYIIDAE) INFESTING PINXTERBLOOM AZALEA FLOWERS IN MARYLAND AND WASHINGTON, D.C.

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Abstract.—A gall midge (Diptera: Cecidomyiidae) new to science, described and named here as ***Dasineura praecox,*** destroys the flower buds of pinxterbloom, *Rhododendron periclymenoides* (Ericaceae). Its biology is unique for *Dasineura* because adults emerge and oviposit in autumn instead of in spring. Larvae pass the winter as pharate larvae and begin to feed in late winter before the ground is unfrozen.

Key Words: gall midge, *Dasineura,* pinxterbloom, *Rhododendron*

Pinxterbloom azalea, *Rhododendron periclymenoides* (Michaux) Shinners, blooms in late April in the vicinity of Washington, D.C. Among the showy pink flowers can also be seen flower buds that have been aborted. Lying among the scales and flower parts of the aborted buds are yellow gall midge larvae less than 3 mm long. By the end of April, these larvae have dropped to the ground and burrowed into the soil. Affected buds then succumb to rot and die. Earlier notice of this damage to pinxterbloom was given in Gagné (1993, 1994b). A notice on the biology of this new species with color photographs of its damage and life stages is given elsewhere (Gagné 1995). The gall midge responsible is described here for the first time and named *Dasineura praecox.*

Most gall midges and all other *Dasineura* species in northeastern North America whose biologies are known overwinter as full-grown larvae, either in the ground or in plant tissue. They pupate in spring and adults emerge a short time later to lay eggs on or near the newly developed plant tissue. Larvae quickly hatch and, sometimes following a short period of relocation, soon begin feeding. The biology of this new species of *Dasineura* is unique in that adults emerge and lay their eggs in the fall. Eggs develop rapidly as in other species, but the fully developed larvae inside do not hatch until late winter.

Two other gall midges are known to attack the genus *Rhododendron* in eastern US and should not be confused with the new species. These are *Clinodiplosis rhododendri* Felt, which rolls and distorts young leaves of *Rhododendron catawbiense* Michaux and *R. maximum* L. (Specker and Johnson 1988), and the less well known *Asphondylia azaleae* Felt which infests leaf buds of *R. periclymenoides* and *R. prinophyllum* (Small) Millais (Gagné 1989).

Methods.—I observed the progress of the new species found in woods on the South Farm of the Beltsville Agricultural Research Center, Beltsville, MD, from spring 1993 to autumn 1994. Full-grown larvae intended for rearing were placed in a pot filled with damp peat moss. The pot was

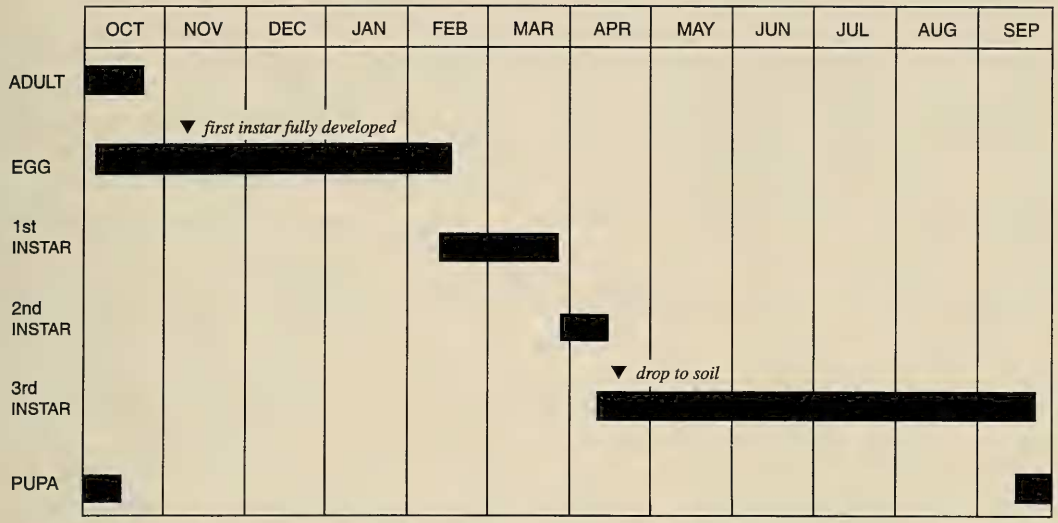


Fig. 1. Development of *Dasineura praecox* over period of one year. End points of bars are approximate, but for the pupa they are estimated only.

kept inside a covered cardboard shoebox with a clear glass vial affixed to one end to attract emerging adults to the light. The vial was checked periodically, and the peat moss kept damp. Some larvae and adults were killed and stored in 70% ethyl alcohol. Specimens for microscopic study were mounted on glass slides in Canada balsam, using the method outlined in Gagné (1989, 1994a). All the study specimens are deposited in the U.S. National Museum of Natural History (USNM). In the description that follows, anatomical terminology of the adult stage follows McAlpine et al. (1981) and that of the larval stage follows Gagné (1989).

Biology.—Fig. 1 summarizes the life cycle of *D. praecox*. In mid-April, 1993, up to 75 mature, yellow, third instar larvae were found among the flower parts and bud scales of unopened flower clusters. Larvae were quiescent and apparently no longer feeding, their heads directed towards the bud apex and not engaged with the plant. For two weeks in April, 1994, larvae lay in the flower buds, although when disturbed they became active and quickly wriggled out of the buds. On the day following a heavy rain on April 28, 1994, no larvae remained in the buds. Upon dropping to the ground, larvae immediately burrowed beneath the surface. There the larvae spun ovoid, white cocoons in which they curled in a "u" shape and became still. I did not determine when the larvae entered the pupal stage, but larvae had not yet pupated by July 30, 1994. Adults emerged between October 1 and October 22. The surface of the peat moss from which they emerged was covered with white pupal exuviae, so the fully developed pupae had crawled from the cocoons to the surface of the peat before adults emerged.

Eggs were found between outer bud scales of flower buds collected in the field on November 8, 1993. Eggs were elongate-ovoid, set side by side in groups of 10 or more. No eggs were found among the primordial flowers, possibly because the tightly overlapping inner bud scales prevented entry of the ovipositor. Eggs collected November 8 contained quiescent, fully developed first instar larvae. All heads were pointed toward the bud apex. Upon hatching in spring the larvae were in position to crawl directly upward, around the top of the outer bud scales, and then downward into the flowers.

Stationary, whitish first instars about 0.4 mm long, were first noticed on February 23, 1994, lying on the surface of stamens and

pistils. Until March 15 when the flower parts of normal and infested flowers were only beginning to swell, larvae grew only to 0.5 mm long. By March 17, 1994, the first instars were noticeably larger, up to 0.6 mm long, and appeared to be more motile. Minute brown areas were noticeable on the pistils or stamens near apparent feeding points. By March 25, 1994, larvae still had not molted but the brown spots were more pronounced and the flower parts showed some distortion. By April 4, all larvae had molted to the second instar. They were greenish white and about 1.6 mm long. Stamens and pistils in infested buds showed some deformation and more extensive brown scarring. Both infested and uninfested buds were enlarging, but none were yet open.

On April 8, second instars were noticeably larger, about 2.3 mm long. Flowers parts showed conspicuous distortion and scattered brown spots. By Apr. 12 the second instars were about 2.5 mm long. At this time stamens and pistils of uninfested buds were elongating and the petals becoming reddish, and new leaves were emerging in straight, narrow fascicles about ½ inch long.

By April 14 most larvae had molted to the third instar. These were yellow and about 2.5 mm long. Third instars apparently did not feed, but crawled away from the stamens and pistils, repositioned themselves head outwards among bud scales, and became inactive. On April 20, 1994, uninfested flowers lengthened and unfurled quickly while infested buds remained closed. On April 25, 1994, uninfested pinxterbloom flowers were in full bloom. Larvae still remained in the flowers until three days later when, evidently in response to a heavy rain, the larvae left the buds and dropped to the ground.

Dasineura praecox Gagné, New Species
(Figs. 1–10)

Adult.—*Wing length:* male, 1.8–2.0 mm (n = 8); female 2.0–2.2 mm (n = 8).

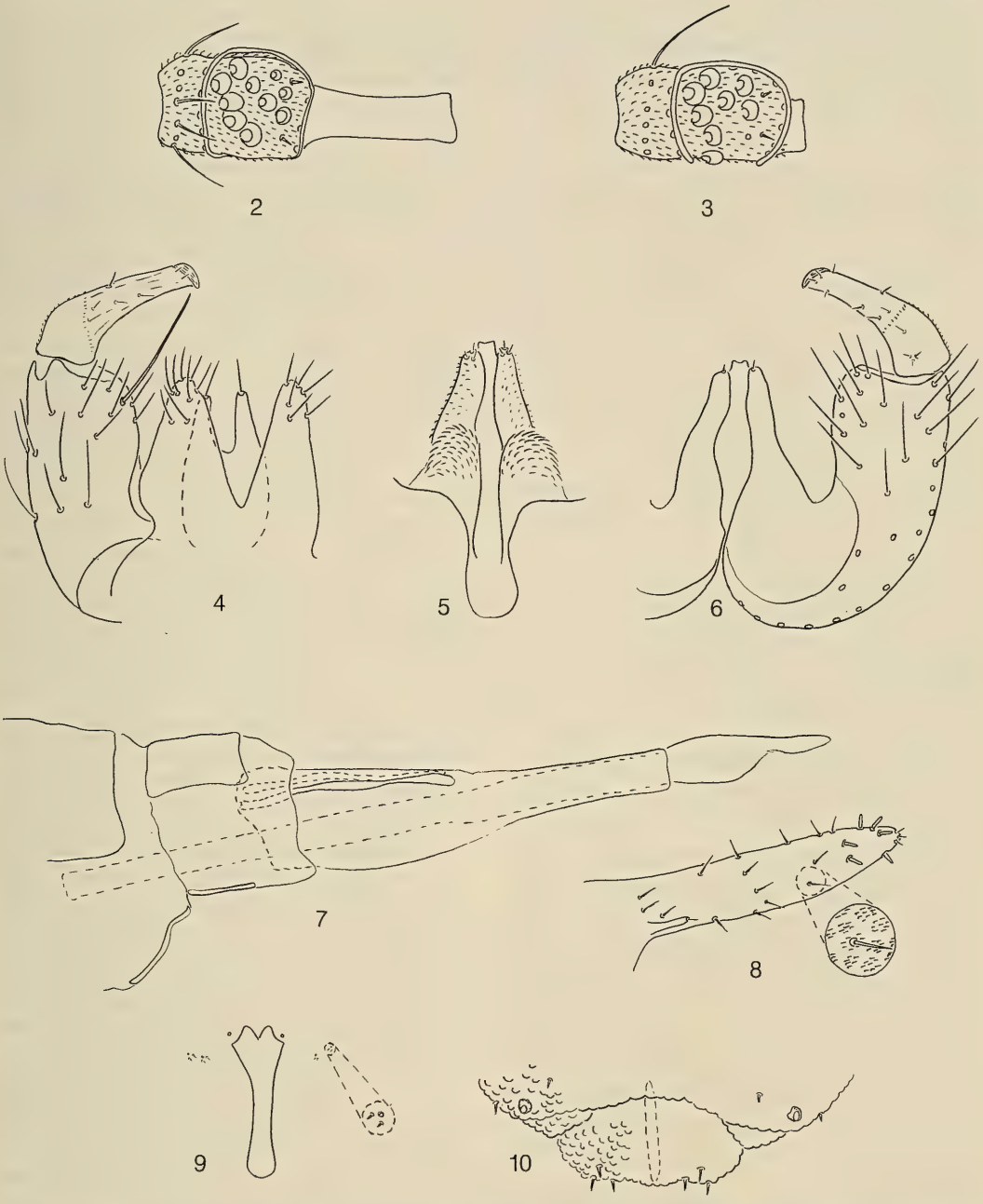
Head: Eyes 5–6 facets long at vertex; facets circular, contiguous. Vertex of occiput broadly rounded. Frons with setae and scales. Labella hemispherical, each with 8–10 setae. Palpus 4 segmented. Male antenna with 15–17 flagellomeres, the third as in Fig. 2. Female antenna with 15–16 flagellomeres, the third as in Fig. 3.

Thorax: Scutum with 2 lateral and 2 dorsocentral rows of mixed setae and scales. Scutellum with a group of setae on each side. Mesanepisternum covered with scales on dorsal third. Mesepimeron with 11–15 setae. Wing with R_5 joining C anterior to wing apex. Claws toothed, empodia as long as claws.

Male abdomen: First through fifth tergites entire, rectangular, with single, uninterrupted, posterior row of setae and scattered setae anteriorly; sixth tergite as for fifth except that anterior setal row interrupted mesally; seventh tergite unsclerotized caudomesally, with 2–3 setae posterolaterally, scattered scales laterally; eighth tergite reduced in size, bare except for anterior pair of trichoid setae. Genitalia (Figs. 4–6): cerci rounded apically, with several setae along posterior margin; hypoproct with two long narrow lobes, each with distal seta; claspettes elongate, attenuate, with dorsobasal lobes; gonocoxite cylindrical, unlobed; gonostylus cylindrical, tapered from base to apex, setulose at base, striate beyond to short distal tooth.

Female abdomen (Figs. 7–8): First through sixth tergites rectangular, with single posterior row of setae, anterior pair of trichoid setae, and almost completely covered with scales elsewhere; seventh tergite much narrower, with double row of posterior setae and scattered scales; eighth tergite much longer and divided into two elongate sclerites; distal half of ovipositor elongate, about 6 times length of sixth tergite; cerci fused, cylindrical, slightly bilaterally flattened, basal two-thirds with widely scattered, short setae, distal third with several short, thick setae, the entire surface covered with patches of short setulae; hypoproct narrow, elongate.

Larva.—First instar: white; length, 0.4–



Figs. 2–10. *Dasineura praecox*. 2, Male third antennal flagellomere. 3, Female third antennal flagellomere. 4–6, Male genitalia: 4, gonopod, cerci, and hypoproct (dorsal); 5, parameres and aedeagus (dorsal); 6, parameres, aedeagus, and gonopod (ventral). 7, Female abdomen, sixth segment to end (lateral). 8, Female fused cerci with detail of surface (lateral). 9, Third instar spatula with associated papillae, with detail of one group of lateral papillae. 10, Third instar eighth and terminal segments (dorsal).

0.6 mm.; integument smooth; spiracles on prothoracic and eighth abdominal segments. Second instar: greenish-white to white; length, 1.6–2.5 mm.; integument smooth; spiracles on prothoracic and first through eighth abdominal segments. Third instar: yellow; length, 2.5–2.6 mm; integument rugose; spiracles on prothoracic and first through eighth abdominal segments; spatula (Fig. 9) clove shaped; papillae basic for supertribe present (Gagné 1989); terminal papillae (Fig. 10) with 8 setae of equal length (2 not shown, hidden from view dorsally).

Pupal exuviae.—White. Face smooth, clypeus with two papillae at each side near base, one of each pair with short seta. Cephalic setae and prothoracic spiracles elongate. Abdomen covered dorsally with spicules, those mesoanteriorly on second to eighth segments enlarged, spinose.

Holotype.—Male, emerged X-1993 from larva collected IV-23-1993 in flower bud of *Rhododendron periclymenoides,* South Farm, Beltsville Agricultural Research Center, Beltsville, Maryland, R. J. Gagné, deposited in the USNM. Other material examined, all from *R. periclymenoides,* mounted on slides and deposited in the USNM: 7 males, 8 females, same data as holotype; 5 pupal exuviae, same data as holotype; 32 first instars, collected III-10-1994, same locality as holotype; 13 second instars, collected IV-4-1994, same locality as holotype; 8 third instars, collected 23-IV-1993, and 6 third instars, collected IV-14-1994, all same locality as holotype; 10 third instars, collected 22-IV-1994, Fern Valley, US National Arboretum, Washington, D.C. Additional specimens of all stages in alcohol in USNM.

Etymology.—The specific name *praecox* is an adjective meaning precocious, with reference to the adults' autumn flight period and early eclosion of the larvae in late winter.

Remarks.—The genus *Dasineura* is an artificial, catchall category and contains species of the tribe Oligotrophini that have four palpal segments, toothed tarsal claws, a shortened R_5 wing vein that meets the costa anterior to the wing apex, and the full basic complement of larval papillae for the tribe. The new species resembles in some ways *Dasineura oxycoccana* (Johnson), a species that infests buds of *Vaccinium* species. The male and female genitalia of both species are superficially similar. The female cerci of both species bear several thick, subapical, sensory setae. *Dasineura oxycoccana,* however, is a smaller species with a wing length of only 1.2–1.4 mm and only 13–14 antennal flagellomeres. The two species differ greatly in their biology: while *D. praecox* has one generation per year and its adults appear in autumn, *D. oxycoccana* has two or more generations per year and its adults appear in spring and summer (Gagné 1989).

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